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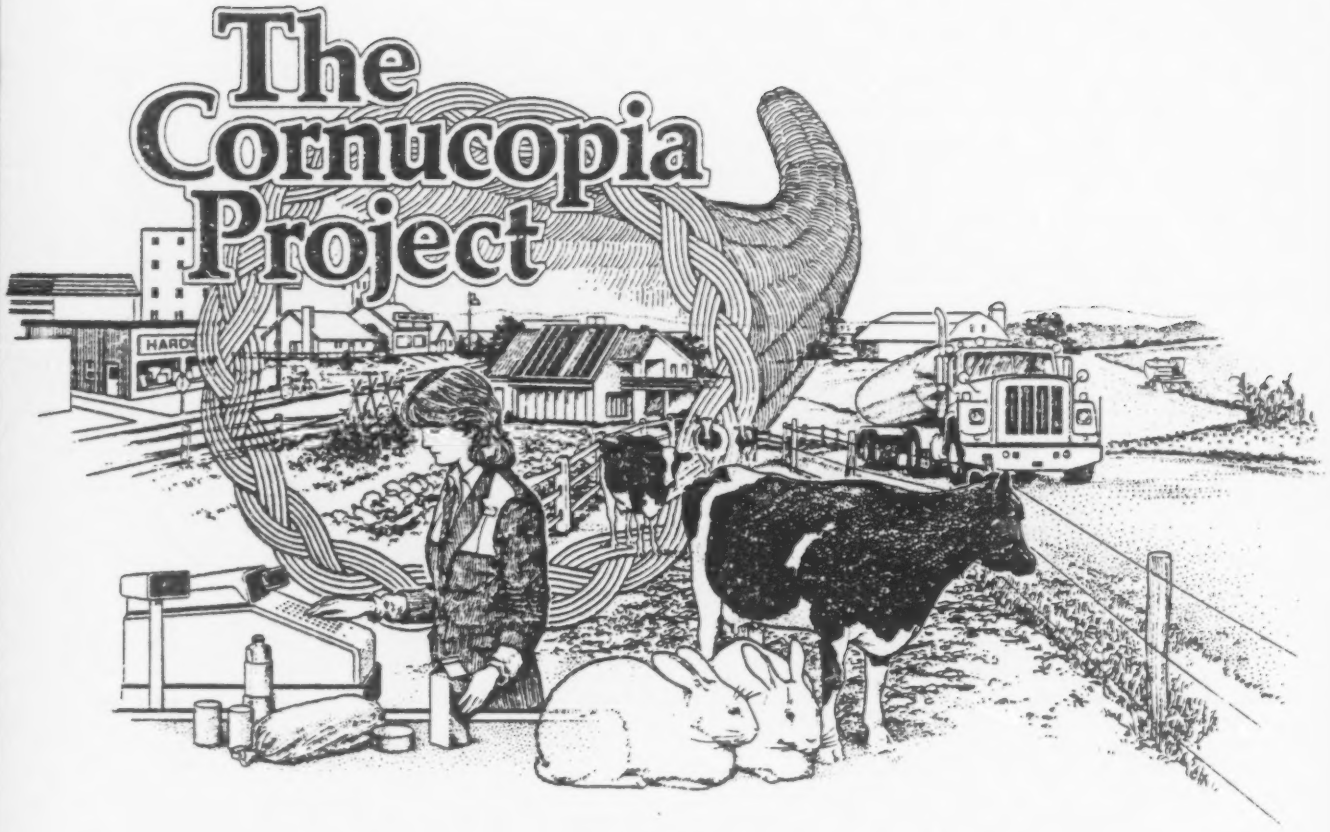

The Massachusetts Food System:

LEADING THE NATION IN VULNERABILITY OR FORGING A PATH TO SELF-RELIANCE?

A study of the food system of Massachusetts by

PETER L. ENGEL

and

The Cornucopia Project of the Regenerative Agriculture Association

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INTRODUCTION

Massachusetts has an agricultural history that extends back over three hundred years, when the Plymouth colonists raised crops for export to England.[1] By the 19th century, Massachusetts farmers raised a wide variety of fruits and vegetables for the urban markets of Boston, New York, and Philadelphia. Onions, asparagus, rhubarb, pickling cucumbers and apples were all important crops that supported a thriving canning industry. Irrigation, cold frames and commercial greenhouses were used to improve and extend the short New England growing season.[2]

By the end of the 19th century, however, Yankee ingenuity and hard work could not compete with the rapidly expanding railway system that brought cheap food and fiber to New England from California, Florida, Kansas, and other states with long growing seasons and deep, fertile soils.

Thus began our dependence on out-of-state sources for our food. The gradual decline in Massachusetts agriculture has had some frightening consequences.

* Massachusetts imports 93 percent of its food.
* Food transportation costs consumers over $1.4 million each day.
* Food export value is $4 billion less than food imports.
* Each year 97 million pounds of fresh vegetables and fruits are damaged or spoiled in transit to Massachusetts.
* We are losing 2 million tons of topsoil to erosion each year -- enough to fill 104,950 semitrailers to capacity.
* Development of our prime farmland continues to exact a heavy toll on our productivity. An area the size of Springfield is lost every 8 months.
* Last year Massachusetts lost 100 farms; in the last 30 years, 16,320 farms have disappeared.

* Last year Massachusetts farm real estate debt rose 13 percent to $101 million. (National average increase was 11 percent.)

* The need for heavy fertilizer application by farmers is highly questionable given a 1981 survey of soil testing labs which showed widely conflicting results on the same soils.

These are symptoms of an unhealthy dependence on a system over which we currently have very little control. Our food is brought to our tables by a complex food system of farmers, harvesters, packers, shippers, processors, wholesalers and retailers. In addition to the efforts of public and private organizations in Massachusetts, many steps can be taken to bolster this food system. This report will address some of the major issues confronting our food system, and will recommend ways of increasing local control of our complex food system.

Our dependence on distant food sources makes us vulnerable to problems and weaknesses in the national system. Energy supplies will probably continue to fluctuate, causing periodic shortages in gasoline that will make it prohibitively expensive to ship lettuce from California or tomatoes from Florida.[3] Natural gas is used to make the ammonia for nitrogen fertilizers. If natural gas prices are decontrolled, nitrogen fertilizers could increase in price from about $200 per ton to nearly $500 per ton.[4] Most of our food is brought to us by truck, which makes our food supply vulnerable to labor disputes or a sudden increase in fuel prices. Then there are the unpredictable events like early frosts, late rains, droughts, and crop blights. We've all seen what heavy rains in California can do to produce prices in Massachusetts.

A strong food and agriculture system will benefit Massachusetts residents in many ways. A regional food system is an insurance policy against the instabilities and weaknesses in the national system. Agriculture is an industry that provides jobs and economic benefit throughout the entire economy. Also, food grown closer to home is fresher and less expensive. Although it will not be easy, the people of Massachusetts can make changes in the structure of the food system. To this end, the recommendations section of the report is tailored for all of us. There are things that the consumer can do as well as the farmer, food industry, researcher, and local and state policymaker. We all are in it together and it is together that we need to work to create the kind of food system that will assure our children and our grandchildren an affordable and secure supply of food.

Food Imports

Considering Massachusett's position as third among the New England states in cash receipts from farm marketings,[5] it is surprising that we must import 93 percent of our food. Although no one may be surprised that we import all of our coffee, tea, oranges, grapefruit, and bananas, it is very surprising how many other foodstuffs we continue to transport into the state which could readily be grown and raised here. While tossing their salads, Massachusetts residents should realize that most of the vegetables come from out-of-state: 94.5 percent of the lettuce, 99.5 percent of the celery, 67.8 percent of the cucumbers, 75.6 percent of the green peppers, and 82 percent of the fresh tomatoes. Few homemakers may know that many of the ingredients stirred in their beef stew have also traveled long distances before reaching the pot: 90 percent of the beef, 88.5 percent of the onions, 82 percent of the carrots, and 79.3 percent of the beans. To top their shortcakes, Massachusetts residents import 85.2 percent of their strawberries.[6] From such diverse states as California, Texas, Florida, and Idaho, 1,086 truckloads of fresh meats, fruits and vegetables roll into this state each week.[7] In a few cases, we even import the very same foodstuffs we export. Take sweet corn. Although last year we exported over 18 million pounds of sweet corn, we also imported 2 million pounds from as far away as Florida.[8]

Since most of our food has journeyed thousands of miles to reach our plates, that is where 66 percent of our food dollars still go -- outside the state (about 28 percent of our food expenditures go to the Massachusetts retailer).[9] During 1980, Massachusetts residents spent an average $906 per person for food, amounting to a $5.2 billion total food tab. Of this amount, $4.8

billion was spent on food produced outside the state, an average of $600 per person leaving Massachusetts each year to pay for our food. We have a long way to go before we even come close to where our food exports reach the dollar value of our food imports. The present difference is $4 billion.

What do all these numbers mean? To the Massachusetts consumer they dish up some disturbing news.

Our food supply is vulnerable. Because we depend on outside producers for most of our food, our supply is highly uncertain. An oil embargo or energy shortage, a labor dispute, a Med-fly invasion, a drought or crop failure in Florida or California -- any of these could lead to serious shortages. California produces over 40 percent of the nation's fresh fruits and vegetables and close to 54 percent of our processed fruits and vegetables.[10] Any failure along the supply lines of the national food system could have disastrous consequences.

In Massachusetts, a six day transportation disturbance would cause some spot shortages that would rapidly get worse.[11] After a two week halt in transportation, many grocery stores would be empty.[12] Small stores with limited storage facilities would be the first to run out of food. If people knew that a shortage was likely, a "food panic" could empty stores in a day.

These scenarios are not just fantasy. The oil embargo of 1973 had serious effects on food, including higher prices, unavailability of some food products, panic buying, and rationing of the products available.[13] A similar disturbance today would have equally serious consequences. Because of inflation and high interest rates, grocery store, warehouse and food processor back-up inventories

are even lower than usual. Winter storm warnings often cause local stores to empty out. If something similar happened on a state-wide scale, many of us would soon be hungry, and we wouldn't last long on the surplus supplies of sweet corn, cranberries and fish produced in the state. If a supply disruption lasted long enough, social order in food-short urban areas could even break down. A serious food shortage in a city could have an effect analogous to yelling "fire" in a crowded theatre.

Transportation costs alone account for over $520 million each year, or $1.4 million each day, of our food bill. The charge for transporting just the fresh vegetables for our salads, stews, and casseroles came to $27 million last year.[14] Clearly we are paying a higher price for our meals than we have to.

Almost 10 percent of the food that is shipped to Massachusetts from around the country never reaches our shopping carts because of waste that occurs in transportation, wholesaling and retailing.[15] Last year, this loss in Massachusetts came to a staggering $43 million for fresh fruits and vegetables alone. In the long journey from grower to consumer, 97 million pounds of fresh fruits and vegetables were spoiled or damaged.

In addition, food that has to travel cross-country must be picked before it is fully ripe, so both its flavor and nutritional value suffer. In short, we end up paying more for food of lesser quality.

Dependence on distant food also means drastic price rises if any problems occur. A study by the U.S. Department of Energy concluded that an energy shortage or reduction of 10 percent in our oil supply would lead to an increase of 55 percent in the price of fresh fruits and vegetables.[16] As

energy prices increase, buying foods that are locally produced and processed is going to make good economic sense for Massachusetts consumers.

In addition, our state and local economy is weakened. Keeping more of our food dollars here would strengthen Massachusetts. An economically healthy farming sector increases the strength of the whole region. Every dollar of output from the livestock sector of farming generates $2.78 of total product throughout the economy on its way to final consumption. Every dollar of output from the crop sector generates $1.81 of total product.[17] A strong farming sector not only generates income, but provides jobs for non-farm workers.

Amount of Agricultural Land

A more visible sign that our food system is in trouble is the continued dwindling of the base of our food system -- our agricultural land. Paved over, converted to other land uses, or temporarily removed from productivity and classified as marginal land, our agricultural land (cropland and pastureland) declined by 18 percent between 1967 and 1977. Development and agriculture vie for Massachusetts' 448 thousand acres of prime farmland, 36 percent of which is currently under cultivation.[18] Level, well drained and requiring few conservation measures, prime farmland has always been favored for development. It is, however, a limited resource. Once we build on our prime farmland, agriculture is forced to move to marginal, less productive land. Each year 30,000 more acres of agricultural land are irretrievably lost: an area the size of Springfield is lost to agricultural production every eight months.[19] The 47 square mile area that is lost each year could provide Massachusetts with over 90 percent of our annual fresh, frozen, and canned

vegetable consumption.[20] Not included in these figures are the additional acres that are isolated by leap-frog development, and either eventually removed from production altogether or severely inhibited by non-farm activities surrounding them.[21]

Soil Erosion

"For sale" signs on farmland are not the only indications of our diminishing food base. Perhaps more insidious, because less visible and more cumulative, are the yearly losses of 2 million tons of topsoil from cropland, pastureland, and woodland due to sheet and rill erosion. This is enough to cover 1,093 acres of land with a foot of soil every year. Measured another way, enough soil is eroded from Massachusetts farmland each year to fill 104,950 semitrailers to capacity.[22]

Excessive erosion exacts heavy costs on our productive abilities. One acre-foot of eroded soil contains about 8,000 pounds of nitrogen and 2,000 pounds of phosphorus.[23] Through erosion alone, we lose over 8 million pounds of nitrogen and 2 million pounds of phosphorus annually.[24] This represents over $3 million at current fertilizer mineral costs.[25] Each acre-foot of topsoil also stores 2 inches of available water for crops. With our current topsoil losses, we are washing away the capacity to hold over 59 million gallons of water each year,[26] and depleting the soil of its vital moisture retention abilities. Over time these decreases point to lower yields per acre.

Farm Numbers and Size

The current statistical definition of a farm is "any place from which $1,000 or more of agricultural products were sold, or normally would have been sold".[27] Given a small scale or regional farming system, this definition overlooks those producers whose income is below $1,000, but whose impact on

the local food system is nevertheless important. In the future, data on farm numbers should be augmented with information on food producers who are currently overlooked by the current statistical definition.

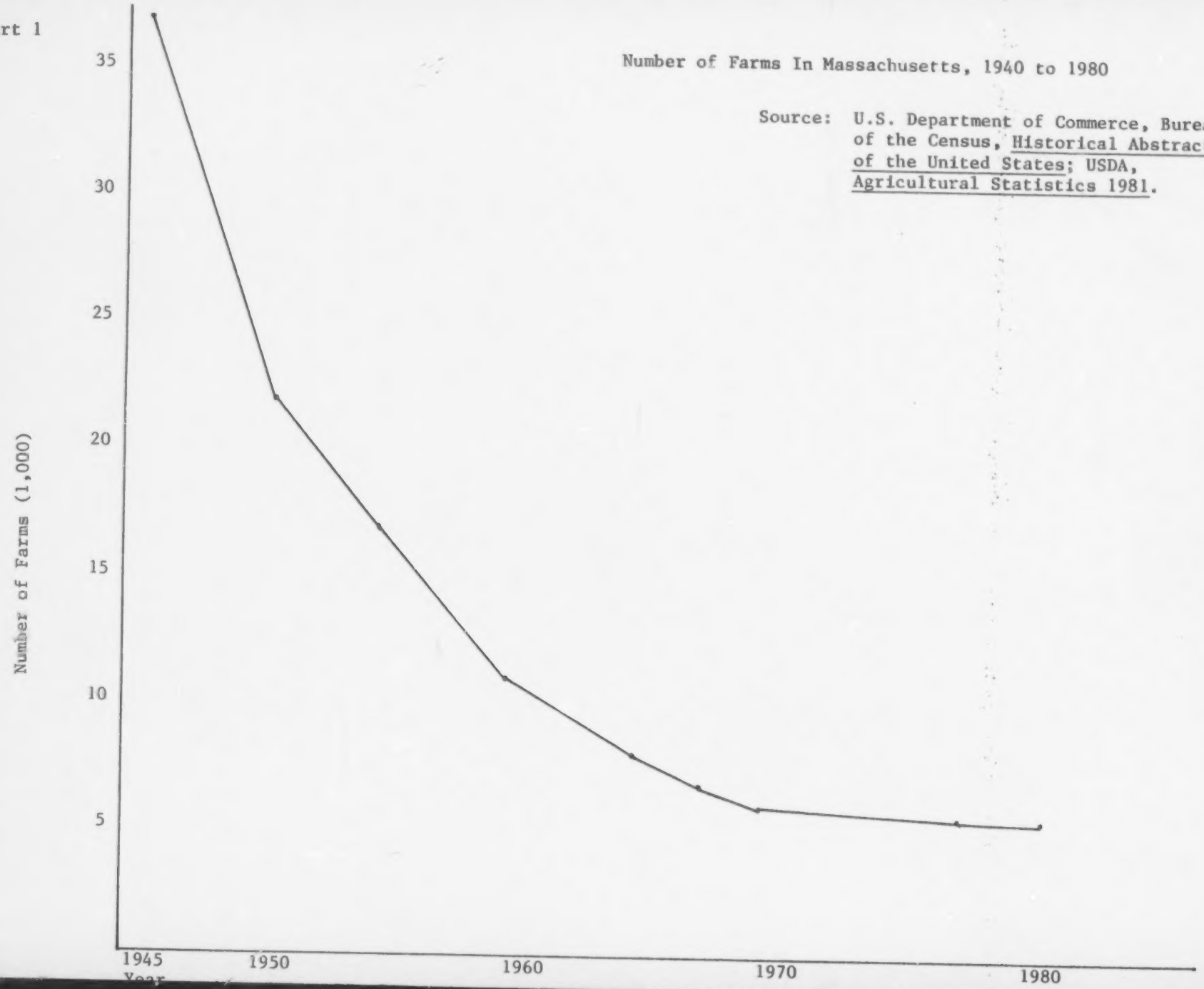
Given the data available, it can be seen that the number of farms in Massachusetts has declined steadily since 1945. (See Chart 1.) Since 1945, Massachusetts has lost 84 percent of its farms.[28] In 1981 alone, we lost another 100 farms throughout the state, shrinking an already diminished number to 5,800.[29]

Not only are there fewer farms, but these farms are becoming smaller. At an average size of 117 acres in 1981, Massachusetts farms remain far below the national average of 431 acres.[30] According to the Census of Agriculture, 65 percent of the farms in Massachusetts are under 100 acres, and 47 percent of these are under 50 acres.[31] Small parcels of farmland, despite having good soils, have often been considered uneconomical to farm. This attitude may be changing, however. Recent studies indicate an increase in small farms, particularly in the Northeast.[32] This has been accompanied by an increase in part-time farming. Small scale and part-time farmers grow vegetables, sweet corn, tomatoes, berries, apples, strawberries, beef cattle, sheep, goats, hay, forage crops, and others.[33] Small farms are a perfect match for traditional direct marketing techniques that benefit both farmers and consumers. Continued support from consumers, government officials and researchers studying small scale and part-time farming will help regenerate Massachusetts small farms.

Chart 1

Number of Farms In Massachusetts, 1940 to 1980

Source: U.S. Department of Commerce, Bureau of the Census, Historical Abstract of the United States; USDA, Agricultural Statistics 1981.



Farm Debt

A major reason for the loss of farmland and farms is the debt load which farmers carry, brought on by a combination of high capital requirements, increasingly higher interest rates, and low prices paid for farm products. Nationally, farm real estate debt rose 11 percent from 1980 to 1981.[34] Meanwhile, for the same period, Massachusetts farm real estate debt rose 13 percent to over $100 million. This is an average of about $17,000 per farmer.[35]

A young person interested in entering farming today faces substantial economic barriers. Real estate values in Massachusetts can be up to twice the national average.[36] To buy a moderately sized farm requires a capital outlay of $250,000 to $600,000,[37] usually acquired with a long-term mortgage. Even more money is required to start production. To bring in a modest annual income of $18,000, a farmer has to plan on gross sales of $100,000.[38] Only 8.2 percent of the farmers in Massachusetts fall into this catagory.[39]

To help offset their indebtedness and to make ends meet, 56 percent of the farm operators in Massachusetts are finding employment off their farm. For 70 percent of these, off-farm employment has become their primary source of income as they work 200 or more days away from their farm operation.[40] Even though production is limited by the number of hours the farmer has available to work on the farm, these farms can still provide a significant amount of food for local consumers. Those who cannot get assistance for their operation, or those who do not want or cannot find employment elsewhere, are forced to sell out to larger operators or to developers who will pay as much as $2,000 an acre for flat, well-drained farmland.

Pesticides

The Massachusetts Department of Agriculture administers a pesticide program which controls licensing and certification of pesticide dealers and users. However, pesticides are not always properly applied. They can drift far from their points of application, killing crops and beneficial insect populations downwind. Pesticides that are washed off by heavy rains can find their way into our water supplies, and some pesticide residues remain on the fruits and vegetables we buy in the grocery store.[41]

Since the pesticide program does not keep records of the amounts of pesticides used by farmers, it is impossible to determine the average rate of pesticide application on Massachusetts cropland, as compared to the United States average of 2.3 pounds of active ingredient applied per acre of cultivated cropland.[42]

Beyond the dangers of misuse, and contamination of our food and water, pesticides represent a substantial use of energy. Pesticide application and manufacture account for seven percent of the energy used to produce crops in Massachusetts.[43] This is equivalent to 872,000 gallons of gasoline. Controlling insects and weeds is necessary, but given their side effects and energy consumption, pesticides should be used not as a cure-all, but as a last resort when all other methods fail.

Fertilizers

Fertilizers are the most energy intensive agricultural input. In Massachusetts they account for about 26 percent of all the energy used in farming.[44] Even with a 4.6 percent decrease in fertilizer use from last year, our current 68,780 tons of application may still be too high.[45] Over-application of fertilizer results in wasted energy as well as wasted money.

A high dependence on chemical fertilizers means dependence on a diminishing mineral base, resulting in increased imports of phosphate, anhydrous ammonia (for nitrogen), and potash (for potassium). U.S. supplies of phosphate are expected to dwindle rapidly after the year 2000.[46] At the same time, 90 percent of our potash will be imported.[47] Increased fertilizer costs are bound to be passed along to the consumer.

Increased fertilizer application can lead to increased production, but many farmers routinely apply far more fertilizer than the soil needs or the crops can use. In a 1981 survey of soil testing labs, many labs gave conflicting results even though they were all given the same soils to analyze. Some labs reported inadequate fertilizer levels and recommended large fertilizer dosages while others showed adequate levels of phosphorus, potassium, or nitrogen for the same fields, but still recommended increased fertilizer applications. Residual levels of potassium, phosphorus, and nitrogen in soils are frequently overlooked or ignored, leading to additional applications of fertilizers that increase the farmers' production costs, but give no appreciable increase in yields.[48] In many cases farmers may be increasing their production costs unnecessarily.

Fisheries

The commercial fisheries industry in Massachusetts landed 438.4 million pounds of fish in 1980, generated a total economic impact of $757 million, and employed over 16,000 people.[49] With a 37 percent increase in catch size from 1977 to 1980 and a 57 percent increase in catch value, the fisheries industry would appear to be thriving.[50] Both fishermen and fish processors,

however, express concerr over a variety of issues that must be addressed to assure the continued success of the Massachusetts fisheries industry. Among these issues are economic pressure from imports, maintenance of fishing facilities, and contamination of shellfishing grounds.

In 1978, approximately 8.3 million pounds of fresh finfish were imported into Massachusetts from Canada.[51] Most of the 116 million pounds of frozen fish portions, sticks, and dinners processed in Massachusetts in 1976 were Canadian and European imports.[52] Since most of the Massachusetts fishing industry is based on filleted fresh fish, imports of fresh fish have the largest negative impact on the fish harvesting industry's gross revenues. While fishermen see fish imports cutting into their business, consumers enjoy a wider selection and lower prices for their fish. Fish imports also have the effect of increasing employment in the fish processing industry.

Commercial fishermen are currently investigating the market potentials of non-traditioanl fish, such as dogfish, shark, hake, and cusk.[53] Fishermen need information on the storage, offloading and processing techniques needed to maintain fish quality. Consumers need to beeducated about the many varieties of non-tradional fish available that are nutritious, flavorful and less expensive than the better known fish species. Fishermen also feel the need to use more Massachusetts-caught fish in State institutions, school lunch programs, hospitals, and nursing homes.[54]

If fishermen are to expand their operations, they need adequate port facilities. Fishermen are concerned about deteriorating docks, congestion in dock and off-loading areas, and the lack of ice and boat maintenance facilities. Port communities are often reluctant to allocate funds for an industry that appears to have little economic impact throughout the community. A closer

look however, reveals that commercial fishing generates a lot of overlooked dollars in the community through the subsidiary industries of bait, equipment sales and service and fish processing and sales.[55]

Another aspect of the fishing industry is the contamination of shellfishing grounds by sewage dumping and accumulations or spills of toxic substances. To the north of Boston Harbor, 6,250 acres of shellfish grounds, with an estimated annual potential harvest of 73,450 bushels, are contaminated by sewage waste to the extent that shellfish harvesting is restricted.[56] Clams and oysters filter out and store bacteria and viruses from the contaminated waters in which they feed. Forty-nine percent of the 6,250 acres of shellfish grounds on the North Shore are considered to be moderately contaminated.[57] Clams and oysters harvested from this area must be purified by holding in sterilized water for 48 hours. Purification facilities are operating at capacity and are unable to meet demand.[58] Shellfish from contaminated waters can also be transferred to clean waters, where they will become naturally purified.

As toxic substances such as mercury, oil, and Polychorinated Biphenols (PCB's) have accumulated or been spilled into Massachusetts waters, some shellfishing grounds have been closed, including small areas of Sippican Harbor, Falmouth Inner Harbor, Great Harbor, Falmouth and Red Brook, and Bourne.[59] The amounts and types of toxic substances that contaminate Massachusetts shellfishing areas reflect the manufacturing industries and sewage treatment facilities inland. Clearly, land based activities need to to carefully evaluated to determine their impact on other resources, including the oceans.

The Massachusetts commercial fisheries industry makes a significant impact on the state's economy, and provides a good supply of high-quality protein for Massachusetts residents. There are many complex issues that must be addressed if this valuable resources is to be maintained and improved.

RECOMMENDATIONS

Developing a secure, sustainable and affordable food system is the goal of The Cornucopia Project. To attain this goal will require a great deal of work. In Massachusetts, this work has been begun by a wide variety of individuals and organizations. Efforts toward building a sustainable food system in Massachusetts range from establishing community farms to the Governor's Executive Order recommending that state institutions purchase foods grown in Massachusetts.[60] The recommendations given in this report reflect and complement the work that is being undertaken by Massachusetts consumers to build a sustainable food system.

The major strategic themes running through these recommendations are outlined below. There are recommendations for all sectors of the food system; the farmers who produce our food; the food industry which processes and distributes our food; the cities, which would suffer in the event of a food crisis; the state and local governments which have the power to do many of the things to make Massachusetts' food supply secure; and the research community which can improve the system we now have.

MAJOR STRATEGIC THEMES

I. Massachusetts Should Grow More Food For Local Consumption

Growing more food in-state will provide fresher, better tasting, and more nutritious food for Massachusetts residents. Local production keeps more of our food dollars in-state, creates jobs, and increases state revenues. Less energy will be used in getting food from the field to the table.

A good place to start increasing in-state production is with fruits and vegetables. In 1980, we imported 78 percent of the fresh fruits we consume and 77.3 percent of our fresh vegetables. (See Tables 2 & 3.) Massachusetts has the climate and soils to grow 43 percent of its fresh fruit consumption and over 90 percent of its fresh vegetable consumption.

Home gardens are another way of increasing the amount of food grown in Massachusetts. The average cost of a garden is about $25, for seed, soil preparation, fertilizers, mulch and water. With labor investment of five hours per week, the home gardener can harvest 500 pounds of vegetables worth $414.[61]

II. Massachusetts Should Encourage Local Markets

The benefits of buying locally as much food as possible are numerous and include lower transportation costs, less energy consumed in transportation, less waste due to long distance hauling, and potentially more nutritious produce, since vitamin and mineral content decreases with time following harvest. Local farmers benefit as much as consumers because they have a market for their produce which will pay more than an interstate broker. Currently, about half of the food producers in Massachusetts use some form of direct marketing. Statewide, in 1981 there were 42 farmers' markets and about 500 roadside stands.[62] A U.S. Department of Agriculture study of direct markets showed that local farmers received 44 percent higher gross returns if they sold locally than if they marketed through wholesale channels.[63]

Table 1

Imported Fresh Fruits That Could Be Grown in Massachusetts

Commodity	Amount Imported (%)	Land Required[a] (acres)	Retail Value of Import ($)
Apples	3.56	6,316	1,299,070
Cherries	99.9	2,304	4,436.030
Grapes	99.8	3,219	23,905,720
Melons	97.1	2,673	16,174,110
Peaches	95.6	5,593	15,994,200
Pears	92.0	1,332	7,982,930
Plums	99.6	2,802	6,598,860
Blueberries	31.5	1,201	387,530
Strawberries	85.1	2,376	10,219,310
TOTAL	78.2%	27,816	$86,997,760

a. to provide 100% of consumption.

Table 2

Imported Fresh Vegetables that could be grown in Massachusetts

Commodity	Amount Imported (%)	Land Required (acres)	Retail Value of Imports ($)
Asparagus	65.9	788	1,349,000
Snap beans	48.3	2,334	3,605,870
Broccoli	97.7	1,293	5,715,990
Cabbage	60.0	220	6,072,260
Carrots	82.0	1,346	8,180,900
Cauliflower	88.6	827	4,528,290
Celery	99.5	927	16,536,790
Cucumbers	67.8	2,169	6,454,380
Eggplants	58.3	170	791,610
Lettuce	94.5	6,219	81,643,520
Onions	88.5	1,995	12,477,130
Peppers	75.6	2,213	9,236,740
Potatoes	67.6	13,391	25,447,370
Spinach	83.9	625	4,246,430
Tomatoes	82.0	4,050	38,340,000
TOTAL	77.3%	38,567	$ 224,626,280

a. to provide 100% of consumption.

Consumers received an average 28 percent discount compared to supermarket prices.[64]

One quick and inexpensive way to augment Massachusetts' existing marketing program would be to conduct and publish a survey of all food producers and large-volume food buyers -- such as grocery stores, hospitals, industry, and restaurants -- to determine what farmers would produce, given a market, and what institutions would purchase, in terms of commodity and quantity. Farmers would know what the market was and buyers would know where to obtain fresh, wholesome produce.[65]

III. Massachusetts Should Maintain Its Farm Resource Base

Preservation of Massachusetts farmland can no longer be a debatable issue. We need all our prime farmland. We can no longer afford uncontrolled development on our best lands.

Farmers are critical components of our food system. Efforts must continue to make their livelihood profitable, sustainable, and accessible. People who wish to farm must have the financial and technical support to do so. Farm support services must be maintained to provide essential materials and services to the farm community, especially beginning farmers and small scale producers. Farm equipment dealers, seed and fertilizer salespeople, feed mills, and agricultural credit associations as well as the cooperative extension service supply some of the necessary inputs to the farm sector. The strength of Massachusetts' farm resource base is dependent upon these component parts. Support services are no less important than the other elements.

IV. Massachusetts Should Continue to Expand Consumer Education and Awareness

Informed consumers can actively participate in working towards sustainability and regeneration in the food system. Consumer demand can effectively influence the Massachusetts food industry more than any regulatory or legislative action. Individuals can also have a tremendous impact on local grocery stores and their purchasing policies simply by asking for locally-grown, locally-processed foods. Increased consumer awareness and action may be the single most effective force in changing the direction of Massachusetts' food system.

RECOMMENDATIONS TO CONSUMERS

1. Become more active in your food system. Increase your awareness of what foods are locally produced and which are transported in from other areas of the country. Know the nutritional quality of the food you consume. Share information with friends, neighbors, and supermarket and grocery store personnel.

2. Form a local Cornucopia Project consisting of people who want to work at changing some aspect of their food system. Possible activities include establishing home and community gardens, bartering, cooperative food buying, storing and preserving, setting up food banks, and gleaning from harvested fields.[66]

3. Purchase locally-grown fruits and vegetables in season, taking advantage of their peak nutritional value and decreased cost. You can also process these foods and store them for cold weather months to eliminate higher commercially processed and packaged food prices.

4. Support your local farmers by purchasing food directly from growers, thereby increasing their needed financial support while enjoying fresh, nutritious foods at reasonable prices. Start food co-ops and for additional savings, contract with farmers in the region to produce some of your food.

5. Change your eating habits to improve and maintain your health by consuming less fat, salt, sugar, and cholesterol while increasing fiber and vegetable protein intake.

6. Start a home garden to produce more of your own fruits and vegetables. Community gardens provide a greater selection of produce when the harvest is shared with cooperating gardeners. They offer access to land for those (especially urban residents) who might otherwise be unable to garden.

7. Extend your growing season by building solar grow-frames and/or utilizing container gardening.[67]

8. Start a land trust which could purchase critical agricultural properties as they come on the market, resell them with deed restrictions to new farm owners, or transfer them to other appropriate trusts or to the city, county, or state at some future time. A land trust is a non-profit corporation which is able to own real property or interest in real property. It is one way to offer permanent protection to selective farming areas within local communities.

RECOMMENDATIONS TO FARMERS

I. Farmland Preservation

1. Take advantage of existing laws. Farmers should become better informed about specific state and local laws which can benefit them. These include: differential assessment (Chapter 61A, Farmland Assessment Act (1973); purchase of development rights (Agricultural Preservation Restriction (APR) program).[68]

2. Learn about the diversity of technical assistance and services available to farmers through local conservancies and land trusts, which can show the best options for the future use of land, including areas which are not essential to farm production. This kind of planning service would help farmers realize certain economic benefits while still maintaining and preserving their farm operations.[69]

3. Preserve farmland by markedly decreasing soil erosion. Your local soil conservation district will provide you with assistance in developing or updating a soil and water conservation management program, suggesting strategies to build the soil and reduce the need for increasingly costly fertilizer inputs.

4. Reduce soil losses through combinations of structural and management practices, such as conservation tillage, cropland terraces and diversions, contour farming, the use of crop residues, winter cover crops, and hedges.

5. Take land that is severely eroding out of production.

6. Use marginal lands for grazing livestock instead of crop production.

7. Have soils tested accurately to determine the nutrient value of the soil and its fertilizer needs in order to prevent overuse of costly, energy-intensive fertilizers. Beware of inaccurate soil testing services.

II. Farm Inputs/Resources

1. Diversify production with selected combinations or rotations of crops or an interplay of crops with livestock. This practice would reduce fertilizer and weed control costs while providing the farmer with greater market stability.

2. Diversify production regarding not only types of crops but individual strains of a single crop so as to reduce the risk of farm pests blighting the entire crop.

3. Reduce energy use by investing in more fuel-efficient machinery, looking into solar dryers, letting crops dry naturally whenever possible, adding insulation where feasible, and taking advantage of natural lighting in farm buildings.

4. Consider using management practices that will reduce the need for chemical fertilizers, pesticides, and other expensive inputs.

5. Investigate possibilities for using alternative energy sources, whether they be the conversion of manure into methane or the use of solar heat for crop drying and other on-farm energy requirements.

6. Develop on-farm fertilizer sources by growing nitrogen-fixing legumes and green manure crops.

7. Utilize marginal land in combination with more productive soils and proper management to maintain more cattle, thereby increasing beef and organic fertilizer production.

8. Avoid routine spray schedules. Apply pesticides only when needed and target spraying to delay the onset of insect resistance, reduce undesirable residues, do minimal damage to beneficial insects, and decrease costs.

9. Consider alternatives to pesticide use and/or reduction. These could be: integrated pest management involving monitoring pest levels for proper timing of applications, no-tillage, crop rotations and inter-planting, narrow rows or broadcast seeding to establish a canopy sooner than with wide row spacing, and biological control of pests to maintain the natural ecosystem.

III. Marketing/Economics[70]

1. Organize marketing co-ops to provide restaurants, schools, and other institutions with locally-grown produce.

2. Work cooperatively with the consumer by selling directly to the public. This will ensure a higher price for the farmer's goods and fresher produce for the consumer at a lower cost.

3. Locate marketing centers strategically for the assembly, grading, packing, and distribution of the output from many small producers,

thereby providing large buyers with the volumes and specifications they require.[71]

4. Consider small-scale processing on the farm such as processing sausage, cured meats, pickles, preserves, cheeses, etc. Fresh produce can be washed, stored and packaged for sale to restaurants and markets. Dried beans, nuts, and seeds as well as honey can be sold to food stores and restaurants.

5. Investigate before planting what specific varieties of crops purchasers wish to buy by surveying bulk food purchasers in your area.

6. Sharpen marketing skills by examining price movements to forecast supply and demand. De-emphasize concentration on farm production while allowing time to think, plan, read and analyze the current market so as to obtain a better price for agricultural products.[72]

7. Extend the availability of some produce by staggering planting and harvesting dates between the last frost date of the spring and first frost date of the fall and by selecting varieties with varying periods of maturation. For example, the fall/winter oriental vegetable crops being developed at the Rodale Research Center are capable of extending the growing season.

8. Begin to work towards changing grading and marketing standards that reflect the nutritious quality of the crop rather than its uniformity and appearance.

9. Encourage local newspapers, if a section is not already provided, to devote columns to farm problems and a listing of local/seasonal food availability.

RECOMMENDATIONS TO LOCAL GOVERNMENTS

1. Identify the long and short-term costs to a township before converting any prime farmland to development use.

2. Develop and encourage local food production by:

   a. Establishing city-run gardens in low income areas, and/or providing seeds, tools, and technical assistance on gardening to those receiving food stamps and other kinds of food assistance.

   b. Providing funds to establish gardens and/or greenhouses and subsidizing gardens in schools, prisons, hospitals, and nursing homes.

   c. Establishing community farms on urban fringes to be worked by local farmers or interested city residents. Greenpower Farm in Weston is a good model for this.

   d. Promoting contract growing whereby groups of urban families, co-ops, or the city itself arrange to purchase food directly from a local supplier.

   e. Developing loan funds for food self-reliance projects, such as greenhouses, food preservation and storage operations, and small businesses associated with urban agriculture.

   f. Estabishing urban agricultural testing programs with the state Cooperative Extension Service to test crop varieties, analyze soil for nutrients and pollutants, test crops for pollutant residues, prepare demonstration sites for various types of urban agriculture and waste recycling, and offer technical assistance on farming as well as design and construction of community greenhouses, cold frames, rooftop gardens, etc.

   g. Encouraging local industries which produce low grade waste heat to make use of this energy by producing food in attached greenhouses.

   h. Requiring garden areas in new multiple unit housing projects.

   i. Making certain that urban street tree programs preserve solar access for food production.

3. Develop an encourage local markets by:

   a. Creating mobile farmers' markets and/or fish markets to visit housing projects, neighborhood centers, factories, and universities. Cambridge currently has a bus supplying food to the elderly.

b. Assisting in the formation of food cooperatives, co-op stores, and preservation/storage centers.

4. Develop and encourage local food processing and storage by sponsoring community food preserving facilities where residents use this service free or at a low cost and/or providing incentives to grocery stores to establish food preserving facilities for their shoppers.

5. Facilitate access to food by implementing a "food hotline" to provide referrals for emergency food, food stamps, and meals for elderly.

6. Create a greater understanding of the importance of agriculture to urban areas through educational programs. Offer seminars in urban agriculture, aquaculture, container and rooftop gardening, food preservation, storage preparation, and nutrition.

7. Establish food banks in your area to store and distribute surplus food.

8. Have county institutions purchase their food supplies from local farmers. Executive Order No. 222 recommends this.

9. Set aside areas for recycling facilities.

10. Investigate land use techniques like clustering, performance controls, and transfer of development rights which would give farmers greater options to develop either on the farm or in other areas within the community or region.

11. Establish an Agricultural Development Council similar to the one in Chester County, Pennsylvania. This council would focus on generating economic solutions to the problems of farmland loss in the counties. These local agricultural development councils would be comprised of people from the entire food system in the county and include farmers, processors, distributors, store managers, and farm service equipment dealers, as well as realtors and bankers. The council could develop local markets for local producers. It could survey local producers to see which ones would grow produce for local consumption and survey local stores, restaurants, and institutions to encourage them to purchase more locally grown foodstuffs. The council could also determine where local food is coming from and could promote more consumption of local foodstuffs, As suggested by Chester County, the council could become involved in "farm brokeraging" which would match new farmers with those who want to sell.

12. In addition to enforcing the soil erosion and sedimentation control measures, pass local ordinances similar to the one in Sterling, Wisconsin, which is successfully conserving all agricultural lands over 1 acre in size with a slope greater than 6 percent.

13. Investigate the agricultural Land Evaluation and Site Assessment (LESA) system being developed by the Soil Conservation Service and the U.S. Department of Agriculture. The program will assist planners in identifying farmland that should be protected based on land capability, soil productivity, soil potentials, and important farmland rating.

RECOMMENDATIONS TO THE STATE

1. Promote agricultural production within Massachusetts and in nearby states by:

   a. Offering incentives for farmers to diversify production, utilizing technical assistance from extension agents and low-interest state-guaranteed loans to make changes necessary for diversification.

   b. Establishing demonstration experiments to test crop, animal, and fish varieties suitable to our soil and climate as well as developing low-input sustainable farming techniques.

   c. Providing tax incentives for small-scale food producers, such as not taxing the first $10,000 of income from food produced for local consumption.

   d. Issuing state tax credits for home and farm production, processing, and storing of food.

   e. Encouraging new farmers through loans and incentives to enter into certain types of farming operations, those which would maintain the optimal balance of farm types in the state. (See Research Recommendations #1).

   f. Organizing a farmer linkage program whereby experienced farmers bring prospective farmers into their operation, easing the transfer of land ownership over time. In this way the new farmers would be more successful in avoiding costly farming mistakes while gaining the tenured operator's knowledge of the farm.

   g. Establishing a statewide Agricultural Development Council which would seek to enhance the viability of farming throughout Massachusetts in the same way that industrial development agencies seek to encourage industry to locate in-state. This kind of council would consist of representatives from all parts of the food industry.

2. Preserve remaining farmland in the state by:

   a. Publishing guidelines to help local governments protect agricultural land and enhance farming. These guideline could include ways to prevent "leapfrog" or random development, which removes from production not only the land that has been developed, but which in the long run isolates adjacent farming areas and inhibits certain farming activities. The state could also delineate ways whereby municipalities could best protect farmland in urban fringe areas, and it could prepare guidelines for different kinds of

farmland preservation strategies and techniques including agricultural zoning, transfer of development rights, purchase of development rights, community land trusts, performance zoning, and so forth. It could prepare procedures which would help local governments assess the different kinds of strategies that would be most appropriate and feasible for them, given the extent of farming in the area, development pressures, commitment of farming community to remain in agriculture, existing and potential land use, economic characteristics, natural features, and attitudes of local residents towards preserving farmland.

b. Mapping all farmland that the state believes should be protected from development, identifying all Class I and II soils that are crucial to the agricultural capabilities of the state. The state of California has been engaged in mapping all of its farmland for the last few years in order to identify those areas that are important to the state for agricultural production.

c. Instituting a farmland capital gains tax in ways which would discourage speculators from investing in farmland, and selling it for development.

d. Creating a committee to inventory and monitor all state-owned farmland and assess its productive capability while working to ensure that this land remains in farming.

e. Encouraging municipalities to enact and adopt joint municipal comprehensive plans and joint municipal zoning ordinances. This would be one way to achieve agricultural zoning on a more regional basis, which could anticipate many of the current challenges to its constitutionality.

f. Encouraging legislation which would require a record of agricultural land transfers on an annual basis.

g. Encouraging legislation that would encourage small farming by establishing a family farm security program to encourage loans for the purchase of farm real estate.

h. Reducing the capital gains tax for those farmers who sell farmland to young, beginning farmers, especially if farmland is sold at less than full market value.

3. Expand local markets by:

a. Establishing more farmers' markets and organizing wholesale farmers' markets to supply retailers, consumer co-ops, and other volume purchasers.

b. Increasing promotional efforts for direct purchase of food from farmers by supermarkets, restaurants, schools, hospitals, and other institutions.

c. Encouraging existing processing plants to purchase locally-grown products.

d. Developing linkages between large-volume food buyers and Massachusetts producers.

e. Continuing to support the direct marketing efforts of small scale growers, through grants and technical assistance.

f. Assessing the viability of implementing in Massachusetts marketing alternatives to determine price and maintain market access for individual farmers through electronic commodity markets, vertical coordination through forward contracting, forward deliverable contract markets, and mandatory public reporting of market information. Other options include exclusive agency bargaining, vertical integration through ownership, joint venture between agricultural cooperatives and agribusiness-marketing firms, marketing orders, and marketing boards.[73]

g. Establishing regional livestock marketing committees to evaluate alternatives such as regional market centers owned and operated by either a local or a regional cooperative, a regional electronic sales exchange, and contract sales to packers, while providing for more direct movement from producer to slaughterer thereby decreasing costs.

4. Strengthen in-state food-processing capabilities by:

a. Providing incentives for existing food companies to develop more energy-efficient processing and packaging techniques, along with incentives to attract new food processors who wish to reduce transportation costs by locating near a major distribution center.

b. Helping to establish community food processing and storage facilities for the use of families and small commercial food producers. In this way, economies in equipment and energy consumption can be realized.

c. Providing incentives for on-farm processing, cooling, and fresh packing of local food crops.

5. Effect a transition from depletable to renewable energy sources by conducting regional inventories of all renewable energy sources and providing incentives, such as tax credits or low-interest loans for investments made in agricultural energy conservation and on-site development of renewable energy sources, or tax exemptions for income received from the production of renewable energy.

6. Recycle organic wastes to utilize their full potential by:

   a. Preparing a state-wide inventory of the types and amounts of organic wastes available now and into the future and assess the ability of these wastes to improve soil fertility and tilth and their potential energy use.

   b. Developing incentives for using local organic wastes for fertilizer and incentives to industry to separate toxic substances from their wastes so that they might be more safely used on cropland.

7. Enact a bill which requires returnable bottles and the recycling of metal cans. This would reduce materials consumption in the food system. Massachusetts' new bottle law does not include containers used for dairy products or fruit juices.

8. Protect the natural environment by enforcing existing environmental protection laws, developing programs for safer handling of toxic pesticides and stronger enforcement of laws against pesticide misuse, and developing stricter standards for pesticide residues in foods. Collect data on pesticide use in Massachusetts.

9. Develop long-range food system plans by:

   a. Revising and improving the methods by which crop and livestock production data are gathered so that the future direction of the state's agriculture situation is determined based on accurate, reliable information.

   b. Creating an overall state food policy which will increase regional self-reliance and economic viability while decreasing the vulnerability of the state's food supply.

   c. Planning for an emergency food supply disruption by strengthening our grain storage facilities capacity.

   d. Conducting an annual study of the condition of the state food system to find out the amount of food currently being imported and exported, soil erosion losses, amount of land lost to development, and other food system issues while stating what Massachusetts can do to increase its self-reliance.

10. Instill a greater understanding of agriculture's role in all Massachusetts citizens by:

   a. Increasing awareness of seasonal, locally-grown produce, and its nutritional and economic benefits.

b. Initiating educational programs on farmland preservation, farm energy conservation, reduced pesticide and fertilizer use, recycling of organic wastes, and energy expenditures in different methods of farming and home food production and preparation.

c. Promoting nutrition education campaigns illustrating the relationships between diet and health and the benefits of fresh, locally-grown, and minimally processed foods, as well as bulk purchasing of food.

d. Communicating goals and the condition of our food supply as revealed in the state's annual study.

RECOMMENDATIONS TO THE FOOD INDUSTRY [74]

1. Minimize energy and material use by using less processing (and/or more efficient methods), simpler packaging, and rail networks more often in transporting commodities.

2. Move towards regionalizing food purchasing, processing, and distribution, thereby decreasing transport costs and strengthening the local economy with increased use of local labor.

3. Promote the consumption of fresh, locally-produced food in season, enhancing consumer nutrition and building a stronger local economy.

4. Provide nutrition education, hints for food preparation, and techniques on preserving fruits and vegetables.

5. Focus on food in a holistic way, recognizing that diet is an essential component of a healthy life and is influential in preventing as well as treating illness.

6. Grocery stores should be encouraged to label locally grown foods. Point of purchase literature could be made availabe to consumers to make them aware of where their food comes from and the issues involved with this.

RECOMMENDATIONS TO THE AGRICULTURAL RESEARCH COMMUNITY

1. Determine the optimal mix of farm types in Massachusetts to obtain sustainable yields of both crops and livestock to meet the state's consumption needs and to provide a sufficient level of exports. Determine the production needed to support processing plants for various commodities. If the commodity is produced in quantities sufficient to make a processing plant economically competitive, this would be an incentive for establishing those businesses in state.

2. Assess relationships between biofuels development (including forest resources) and long term soil productivity to provide guidelines for future programs.

3. Investigate how to improve the capability of using forage and Massachusetts crop wastes.

4. Continue and expand small-scale agriculture research programs at the University of Massachusetts. This will not only aid small-scale enterprises, but will also help large-scale farms diversify and become less dependent upon a single commodity. Efforts along this line will help meet local food needs and keep Massachusetts farmland in production.

   a. There is a need for smaller equipment which would use less energy and decrease the amount of soil compaction and erosion, at a cost that small operators can afford.

   b. Continue and expand research on fruits and vegetables and post-harvest handling methods to benefit small-scale producers.

   c. Continue livestock management and forage research programs aimed at smaller enterprises.

   d. Continue to develop beef feeding systems based on forages rather than high-energy grains.

5. Work to develop plants which resist pests and mature earlier so less drying is required.

6. Investigate Massachusetts soil erosion problems, looking at crop residues, run-off, tillage practices, rotation systems, terraces, equipment use, etc.

7. Investigate perennial agricultural systems (permaculture) appropriate to Massachusetts to eliminate annual soil disturbance and decrease energy, fertilizer, pesticide, and herbicide usage.

8. Determine the long-term effects of recommended applications of chemical fertilizers, pesticides, and herbicides on the productivity of selected Massachusetts soils.

9. Update the Stanford Research Institute's inventory of the organic wastes in Massachusetts which are available to improve soil fertility and tilth.

10. Investigate methods to utilize Massachusetts municipal wastes in agriculture.

11. Expand research on biological nitrogen fixation.

12. Develop crop varieties adaptable to low-input farming systems in Massachusetts.

13. Explore the potential of small-scale aquaculture in Massachusetts to provide high-quality protein using cost-efficient and ecologically sound methods.

14. Set up plots to study the transition phase of switching from conventional to low-input farming systems.

15. Examine methods for producing food in cities, e.g. rooftop food production systems. Seek ways to make urban food distribution and marketing systems more accessible to local and regional food producers.

16. Develop more energy-efficient food processing, storing, and distribution techniques.

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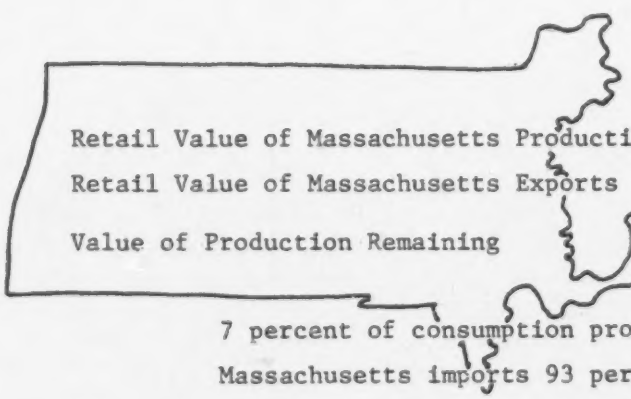
APPENDIX

Massachusetts has a history of successful agriculture, from Colonial export crops to the market gardens of the 19th century that supplied East Coast cities with lettuce, radishes, onions, apples, asparagus and other crops. Today, 93 percent of our food is imported from states as far away as California, Washirgton, Iowa and Florida. Importing our food deprives the Massachuseets economy of $4.8 billion each year. Out of every dollar we spend on food, ten cents pays for transportation. Gas shortages, labor disputes, political actions and bad weather make our food supply vulnerable to disruption.

After forty years of decline, Massachusetts agriculture is beginning to show signs of recovery. The number of small farms producing food for local consumption is on the rise. Consumers have discovered that farmers' markets, roadside stands and pick-your-own operations provide them with fresher food at lower prices. More people than ever before are planting vegetable gardens, either in their own backyards, or in community gardening programs. Farmland is now recognized as a priceless resource, to be carefully preserved. Many private and public sector groups and individuals are working together to make Massachusetts' food and agriculture system sustainable.



Retail Value of Massachusetts Production	$ 608,281,570
Retail Value of Massachusetts Exports	223,456,650
Value of Production Remaining	$ 384,924,920

7 percent of consumption produced in Massachusetts
Massachusetts imports 93 percent of its food.

MASSACHUSETTS FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] (1,000 lbs.) (1980 dollars)	Retail Weight[c] ($1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of MA Consumption[d]
Meats									
Beef	ND[e]		438,880.0	1,042,270.0	90.0[g]	938,043.00			2,831,664.0
Pork	ND		391,830.0	546,600.0	90.0	491,940.00			885,873.0
Lamb	ND		7,458.15	18,846.74	90.0	16,962.06			40,063.0
Veal	ND		86,050.0	264,173.50	90.0	237,756.15			f
Poultry									
Chicken	insignificant		286,850.0	304,060.0	99.9	303,755.94			3,757,600.0
Turkey	insignificant		62,533.7	61,595.7	99.9	61,534.10			51,831.0
Eggs	17,567.78	10,189.31	198,500.0	115,130.0	91.1	104,883.43			142,045.0
Fish									
Finfish: fresh & frozen	69,643.50	177,590.0	30,980.0	78,999.0			55.5	98,562.45	NA[R]
canned	NC[h]		21, 227.04	54,128.94					NA
Shellfish: fresh & frozen	28,248.0	40,959.60	14,342.59	20,796.76			49.2	20,152.12	NA
canned	NC		2,868.52	10,871.69					NA
Dairy									
Fluid Milk	322,740.0[i]	68,733.94	1,384,900.0	317,140.0	78.3	248,320.62			251,360.0
Cream	ND		47,617.41[j]	39,189.13					46,713.0
Butter	ND		25,242.96	49,476.21					104,460.0
Cheese	5,099.0	15,144.03	100,970.0	299,880.0	94.9	284,586.12			238,239.0
Dry Milk	ND		38,438.15	62,654.18					17,581.0
Frozen Dairy Products[k]	88,162.50	80,227.88	150,884.01	137,304.51	41.6	57,118.67			86,784.0

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MASSACHUSETTS FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] (1,000 lbs.) (1980 dollars)	Retail Weight[c] ($1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of MA Consumption[d]
Vegetables, fresh									
Artichokes	NA		1,721.11	774.5	100.0				NA
Asparagus	587.50	699.12	1,721.11	2,048.12	65.9	1,349.71			788.0
Beans, snap	1,546.86	943.60	7,458.15	4,549.47	79.3	3,607.73			2,334.0
Broccoli	226.32	135.79	9,752.56	5,851.78	97.7	5,717.19			1,293.0
Cabbage	19,275.55	4,047.87	48,191.11	10,120.13	60.0	6,072.08			220.0
Carrots	6,291.03	1,792.94	34,995.93	9,973.84	82.0	8,178.55			1,346.0
Cauliflower	847.50	580.54	7,458.15	5,108.83	88.6	4,526.42			827.0
Celery	225.99	89.72	41,880.37	16,626.51	99.5	16,543.38			927.0
Corn, sweet	53,360.00	20,543.60	37,864.44	13,555.47			34.0	6,984.82	4,900.0
Cucumbers[l]	7,395.42	3,069.10	22,948.15	9,523.48	67.8	6,456.92			2,169.0
Eggplant	1,194.93	565.20	2,868.52	1,356.81	58.3	791.02			170.0
Garlic	NC		4,589.63	7,848.27					436.0
Lettuce	7,902.0	4,780.73	142,850.0	86,424.25	94.5	81,670.92			6,219.0
Mushrooms	-0-	-0-	15,490.0	25,558.50	100.0	25,558.50			NA
Onions	6,745.44	1,625.65	58,517.78	14,102.78	88.5	12,480.96			1,995.0
Peppers, green	4,611.68	2,974.54	18,932.22	12,211.28	75.6	923.29			2,213.0
Potatoes, sweet	-0-	-0-	19,505.93	7,997.43	100.0	7,997.43			1,882.0
Potatoes, white	91,496.45	12,169.03	282,830.0	37,616.40	67.6	25,428.69			13,391.0
Spinach	645.74	813.64	4,015.93	5,060.07	83.9	4,245.39			625.0
Squash	48,722.09	12,180.52	6,218.92[m]	1,554.73			87.2	10,621.42	NC
Tomatoes	11,780.0	8,422.7	65,402.22	46,762.59	82.0	38,345.32			4,050.0
Minor vegetables[n]	712.4	391.82	43,027.78	23,665.28	98.3	23,262.97			
Vegetables, canned and frozen									
Asparagus	NC		2,065.33	4,378.51					1,150.0
Beans, snap & lima	NC		45,724.18	36,579.35					11,134.0
Beets	NC		6,884.45	1,652.27					310.0
Broccoli	NC		8,031.85	8,272.81					1,303.0

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MASSACHUSETTS FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] (1,000 lbs.) (1980 dollars)	Retail Weight[c] ($1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of MA Consumption[d]
Vegetables, canned and Frozen									
Carrots	NC		8,203.96	4,594.22					505.0
Cauliflower	NC		2,639.04	2,797.38					385.0
Corn, sweet	NC		44,347.30	23,504.07					14,930.0
Onions	NC		3,901.19	2,067.63					125.0
Peas	NC		27,767.26	18,750.90					7,571.0
Pickles	NC		39,585.55	19,001.07					2,822.0
Potato products	NC		137,680.0	155,580.00					16,653.0
Sauerkraut	NC		6,884.45	2,753.78					263.0
Spinach	NC		7,171.30	3,513.94					588.0
Sweet potatoes	NC		5,737.04	4,618.32					643.0
Whole tomatoes	NC		34,995.93	15,783.16					2,856.0
Tomato sauce, catsup, & paste	NC		69,418.15	35,125.58					13,539.0
Fruits, fresh[e]									
Apples	88,520.37	35,142.59	91,792.59	36,441.66	3.6	1,310.82			6,316.0
Apricots	NA		573.70	682.71	100.0	682.71			NA
Bananas	NA		119,330.0	41,407.51	100.0	41,407.51			NA
Blueberries	747.10	844.21	1,090.04	1,231.74	31.5	387.99			1,201.0
Cherries	insignificant		3,442.22	4,440.47	99.9	4,436.03			2,304.0
Citrus	NA		159,480.0	72,084.96	100.0	72,084.96			NA
Cranberries	107,224.80	91,137.0	573.70	487.65			95.5	87,035.84	54.0
Grapes	44.96	52.15	20,653.33	23,957.87	99.8	23,909.95			3,219.0
Melon	1,105.10	486.25	37,864.44	16,660.36	97.1	16,177.21			2,673.0
Peaches	1,361.11	735.0	30,980.0	16,729.20	95.6	15,993.12			5,593.0
Pears	1,097.58	691.47	13,768.89	8,647.40	92.0	7,980.45			1,332.0
Pineapple	NA		8,031.85	10,361.10	100.0	10,361.10			NA
Plums	42.0	28.97	8,605.56	6,627.83	99.6	6,601.32			2,802.0

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MASSACHUSETTS FOOD IMPORTS

COMMODITY	PRODUCTION		CONSUMPTION		IMPORTS		EXPORTS		
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] (1,000 lbs.) (1980 dollars)	Retail Weight[c] ($1,000 lbs.)	Retail Value ($1,000) (1980 dollars)	% Import	Retail Value of Import ($1,000)	% Export	Retail Value of Export ($1,000)	Acres Required to produce 100% of MA Consumption[d]
Fruits, fresh (cont.)									
Strawberries	1,444.57	1,776.82	9,752.96	11,996.14	85.2	10,220.71			2,376.00
Other Berries[p]	59.42								445.0
Fruits, processed									
Canned fruits	NC		99,136.0	60,968.64					NA
Dried fruits	NC		16,866.89	41,879.49					NA
Frozen fruits	NC		15,891.60	22,985.61					NA
Apple juice	21,400.0	7,447.20	27,308.30	9,503.29	22.0	2,090.72			2,460.0
Other juices[q]	NC		262,920.0	85,711.92					NA
Grains									
Barley	NC		6,884.44	2,801.97					5,628.0[r]
Corn, (meal, cereal, starch, grits)	NC		90,645.18	32,450.96					16,474.0
Oats	389.73	172.65	17,784.81	7,878.67	97.8	7,705.34			8,824.0[s]
Rye (flour)	251.10	89.90	4,015.93	1,437.70	93.7	1,347.13			4,845.0
Wheat (flour, cereals)	NC		687,290.0	212,370.0					370,731.0
Miscellaneous									
Dried peas & beans	NC		39,585.56	26,126.47					36,653.0
Tree Nuts	NC		1,893.22	6,893.22					NA
Peanuts	-0-		34,995.93	72,791.52	100.0	72,791.52			NA

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MASSACHUSETTS FOOD IMPORTS

COMMODITY	PRODUCTION Retail Weight[a] (1,000 lbs.)	PRODUCTION Retail Value[b] (1,000 lbs.) (1980 dollars)	CONSUMPTION Retail Weight[c] ($1,000 lbs.)	CONSUMPTION Retail Value ($1,000) (1980 dollars)	IMPORTS % Import	IMPORTS Retail Value of Import ($1,000)	EXPORTS % Export	EXPORTS Retail Value of Export ($1,000)	Acres Required to produce 100% of MA Consumption[d]
Miscellaneous									
Sugar	NC		479,610.0	222,530.0					99,350.0[t]
Honey	396.0	526.68	8,031.85	10,682.36	95.1	10,158.92			NA
Maple Syrup	330.9	479.81	573.70	831.87	42.3	351.88			NA
Lard & Shortening	NC		119,330.0	97,969.93					
Margarine	NC		64,254.81	56,030.20					
Vegetable oil	NC		130,230.0	100,230.0					
Rice	NA		53,354.44	32,332.79					
TOTALS	1,019,442.42	608,281.57	7,285,391.48	5,202,396.58		3,252,038.93		223,356.65	9,165,595.0

Notes to Food Imports Chart

a. Retail weights of production were determined from: 1978 Census of Agriculture, Vol. 1, part 51; Massachusetts Agricultural Statistics 1980; Tom Marr, New England Crop Reporting Board; Conversion Factors and Weights and Measures, Statistical Bulletin No. 616.

b. Retail prices were supplied by: Robin Hickey, Massachusetts Department of Food and Agriculture; U.S. Department of Labor, Bureau of Labor Statistics; Meat and Livestock Statistics, Statistical Bulletin No. 522; Stop and Shop, Hadley, MA.

c. Retail weights of consumption were determined from Food Consumption, Prices, and Expenditures 1960-1980 Statistical Bulletin No. 672.

d. Land requirements are based on: Income Opportunities from Grain Corn Production on Massachusetts Dairy Farms, Massachusetts Agricultural Experiment Station Research Bulletin No. 645; USDA Agricultural Statistics 1980; Economics of Beef Production and Economics of Small Scale Food Producers by Robert Christenson, Massachusetts Co-operative Extension Service, Amherst, MA.

e. ND - Not disclosed to avoid disclosure of individual operations.

f. Veal is a by-product of the dairy industry, so land requirements would be included in dairy acreages.

g. NA - Not applicable.

h. NC - Not collected by any source.

i. Production figure is based on total milk production, less milk used on farm, and milk equivalents of manufactured dairy products produced in Massachusetts.

j. Includes yogurt, cream, milk-cream mixtures, sour cream, and eggnog.

k. Includes ice-cream, ice milk, sherbert, mellorine, and other frozen products.

l. Production includes cucumbers for pickling.

m. Consumption is fresh equivalent of canned.

n. Includes fresh peas, kale, brussels sprouts, limas, chicory, escarole, collards, and okra.

o. Production of fruits for processing included under fresh fruits.

p. Includes blackberries and raspberries.

q. Includes orange, pineapple, grapefruit and juices that cannot be produced in Massachusetts, and those for which no statistics are collected.

r. Acres required for production based on bushel equivalents of pearl barley.

s. Acres required for production based on bushel equivalents of rolled oats and oat cereal.

t. Acres required based on average yields for sugar beets.

* According to Stinson et. al. in Current and Projected Output of the Massachusetts Livestock Industry and Its Marketing Structure (Amherst: University of Massachusetts, 1978), about 90 percent of the red meat consumed in Massachusetts is imported from other regions.

Massachusetts Food System Organizations

There are many organizations which directly or indirectly are working toward developing a sustainable food system in Massachusetts. The organizations listed here provide information about starting home gardens, food co-ops, farmers markets, land trusts, community gardens, food assistance programs, farmland preservation, direct marketing and farm management. This list is just a sampling of the many groups in Massachusetts who are working to change our food system. Readers are encouraged to learn about the services of the different groups and where appropriate, to join with them.

Massachusetts Farm Bureau Federation
P.O. Box 455
85 Central Street
Waltham, MA 02254

Massachusetts Farm and Conservation Lands Trust
527 Essex Street
Beverly, MA 01915

Massachusetts Federation of Farmers' and Gardeners' Markets
Massachusetts Department of Food and Agriculture
100 Cambridge Street
Boston, MA 02202
(617) 727-5579

Massachusetts Food and Agriculture Coalition
c/o MOC
305 Whitney Street
Leominster, MA 01453

Massachusetts Horticultural Society
300 Massachusetts Ave.
Boston, MA 02115

Massachusetts Lobstermen's Association, Inc.
Box 276 Cove Creek Lane
Marshfield Hills, MA 02051

Atlantic Fishermen's Union
120 Main Street
Gloucester, MA 01930

Coolidge Farms
Topsfield, MA 01983
(617) 887-2787

Institute for Community Economics
151 Montegue City Road
Greenfield, MA 01301
(413) 774-5933

Massachusetts Agricultural Experiment Station
College of Food and Natural Resources
University of Massachusetts
Amherst, MA 01003

Massachusetts Association of Conservation Districts
P.O. Box 106
Vineyard Haven, MA 02568

Massachusetts Department of Food and Agriculture
100 Cambridge Street
Boston, MA 02202
(617) 727-3000

Massachusetts Marine Trades Association
P.O. Box 272
Milton, MA 02186

Massachusetts Small Farm Committee
NE Small Farm Institute
Box 937
Belchertown, MA 01007

New Alchemy Institute
237 Hatchville Road
E. Falmouth, MA 02536
(617) 563-2655

New England Farm Center
Hampshire College
Amherst, MA 01002
(413) 253-7065

Rural Education Center
Stonyfield Farm
Wilton, NH 03086
(603) 654-9625

Small Farm Management Assistance Project
Draper Hall
University of Massachusetts
Amherst, MA 01003